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ON SOME BRANCHIOBDELLIDS (ANNELIDA: CLITELLATA) FROM MEXICO WITH THE DESCRIPTION OF NEW SPECIES OF THE GENERA *CAMBARINCOLA* AND *OEDIPODRILUS*

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Abstract.—A new species, *Cambarincola speocirolanae,* is described from an isopod host inhabiting a cave-like pit in San Luis Potosi, and *Oedipodrilus cuetzalanae* is described from a cambarid host in Puebla as the first member of its genus to be known from Mexico, likewise from a cave-like pit. New localities for *Sathodrilus villalobosi* Holt, 1968, are recorded from Hidalgo and Puebla.

Through the kindness of Dr. Horton H. Hobbs, Jr., I recently acquired some specimens of branchiobdellid worms from Mexico. Many were too decomposed to allow any positive identifications or adequate descriptions, but some can be recognized as specimens of *Sathodrilus villalobosi* Holt, 1968, and of new species of *Cambarincola* Ellis, 1912, and *Oedipodrilus* Holt, 1967. Since the Mexican branchiobdellid fauna is poorly known and these animals are mostly from caves or sinkhole-like habitats and one is from a non-astacoidean host, the new locality records and species descriptions are presented here.

The scanty literature pertaining to Mexican and Central American branchiobdellids was reviewed by Holt (1973a) in a paper in which he recorded fourteen species of the genera *Bdellodrilus* Moore, 1895, *Cambarincola* and *Sathodrilus.* With the addition described below, there are 46 nominal species of *Cambarincola* inhabiting all the major portions of the North American continent, eleven of which occur in Mexico. Fifteen species of the likewise wide ranging genus *Sathodrilus* have been named and described, two of which are Mexican. The species described below is the first of the genus *Oedipodrilus* (two are known from the southern Appalachians) to be recorded from Mexico.

Cambarincola speocirolanae, new species, is the second branchiobdellid to be associated with *Speocirolana pelaezi* (Bolivar y Pieltain, 1950). The quite dissimilar *C. acudentatus* Holt, 1973a, infests this isopod (Holt 1973a:12) or its congener *S. bolivari* (Rioja, 1953). The new localities recorded below for *Sathodrilus villalobosi* include caves or cave-like sinkholes.

Three points from the above may be noted: *Oedipodrilus cuetzalanae* strengthens by its presence in Mexico the opinion that the Mexican branchiobdellid fauna is not distinct from that of more northern regions (Holt 1973a:7); at the limits of their range, branchiobdellids are more likely to be found on non-astacoidean hosts, a point which may have relevance for the question of the origin of the branchiobdellid-astacoidean symbiosis; the occurrence of *S. villalobosi* in Mexican caves is consonant with Holt's (1973b:219) view that most branchiobdellids found in caves are members of epigean species.

The holotypes are deposited in the collections of the National Museum of

Natural History (USNM); the remaining material (identified by the initials "PCH") is kept in my collections in Blacksburg.

My thanks are extended to Dr. Hobbs for making this material available to me and for reading the manuscript.

Cambarincola speocirolanae, new species

Fig. 1

Type-specimens.—Holotype, USNM 80221, and one paratype, PCH 4054, taken on *Speocirolana palaezi* from Sótano del Arroyo, San Luis Potosí, by Peter Sprouse, 22 Feb 1980.

Diagnosis.—Medium-sized worms (holotype 3.2 mm in length), lips entire; no oral papillae; no dorsal ridges; jaws subequal in size, dental formula 5/4; bursa subspherical, about ⅜ body diameter in length, without atrial fold; penis muscular, blunt; spermiducal gland reflexed, subequal to bursa in length, no deferent lobes; prostate large, subequal to spermiducal gland in length and diameter, densely granular, nondifferentiated, no ental bulb; spermatheca with long, slender ectal duct.

Etymology.—For the host isopod.

Description.—The holotype has the following dimensions: total length, 3.2 mm; greatest diameter, 0.6 mm; head length, 0.7 mm; head diameter, 0.4 mm; diameter, segment I, 0.4 mm; diameter, sucker, 0.3 mm. The paratype is of similar size, and in size and body proportions, *C. speocirolanae* is typical of members of the genus.

The lips appear to be without lobes, though this is not easily determined, since both types, mounted entire, can only be viewed in lateral aspect. There are no oral papillae. The head bears one shallow external sulcus other than the prominent peristomial one; there is one internal pharyngeal sulcus. There are no obvious dorsal ridges; the supernumerary muscles are absent, but thin slips of the longitudinal segmental muscles insert on the inner edge of the sulcus that delimits the posterior, minor annuli of the anterior segments.

The jaws are subequal in size. The dental formula is 5/4, the teeth are sharp and distinct.

The spermiducal gland is proportionately small, bent in a broad u-shape alongside the gut. The prostate is larger than the spermiducal gland, lacks an ental bulb and is composed of densely granular cells, rather than the vacuolated ones of species described as having a differentiated prostate.

The ejaculatory duct is difficult to see in the type-specimens, but apparently is in no wise unusual.

The bursa, subspherical in shape, lacks an atrial fold or an externally delimited penial sheath region. The retracted penis is densely muscular, short and blunt: clearly of the type referred to as protusible.

The male reproductive system as a whole is rather small, extending dorsad hardly beyond the mid-point of its segment's diameter and in the slightly differently orientated paratype seeming to lie entirely underneath the gut.

The spermatheca has a long, slender ectal duct, but the bulb is totally obscured by gut contents in both specimens.

Variations.—The paratype is more fully extended than the holotype and as

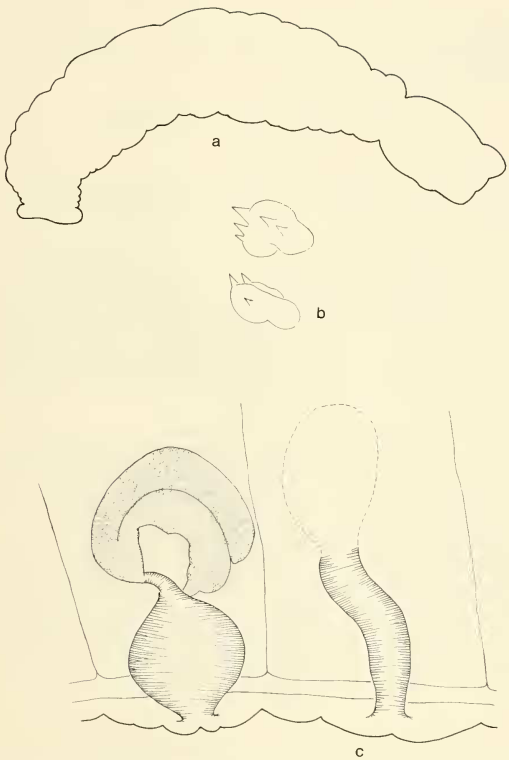

Fig. 1. *Cambarincola speocirolanae,* new species; holotype. a, Outline of entire animal; b, Jaws; c, Lateral view of reproductive systems.

noted the male efferent apparatus appears to lie beneath instead of alongside the gut.

Affinities.—*Cambarincola speocirolanae* has *C. jamapaensis* Holt, 1973a, as its closest relative. The latter is somewhat smaller, approximately 2.0 mm instead of 3.0 mm in length, and has lobed instead of entire lips, jaws with less prominent teeth, dorsal ridges produced by prominent supernumerary muscles, a straight instead of a reflexed spermiducal gland and a smaller prostate with an ental bulb. Although only two mature specimens of each species are known, the prostatic ental bulb and dorsal ridges of *C. jamapaensis* effectively separate them.

Host.—*Speocirolana palaezi.*

Distribution.—Known only from the type-locality. A *sótano* is a "word applied to a vertical shaft" (Reddell 1981:4).

Material examined.—The types.

Oedipodrilus cuetzalanae, new species
Figs. 2, 3b

Type-specimens.—Holotype, USNM 80223, and eight paratypes, PCH 4050, taken on *Procambarus* (*Villalobosus*) *cuetzalanae* Hobbs from Sima Zoquiapan, 1.1 km north of Cuetzalan, Puebla, by L. Wilk, J. Hooper and M. Minton, 2 Jan 1980.

Diagnosis.—Small worms (holotype 1.6 mm in length); lips entire; no oral papillae; no dorsal ridges; jaws slight, delicate, dental formula 5/4; bursa, including penial sheath, slightly greater than body diameter in length, with atrial fold; penis eversible tube furnished with hooks; spermiducal gland small, less than ½ body diameter in length; prostate obscure ental protuberance of spermiducal gland; spermatheca greater than body diameter in length, with long ectal duct, cylindrical bulb, no ental process.

Etymology.—Of Cuetzalan, a town in Puebla.

Description.—*Oedipodrilus cuetzalanae* is composed of small worms. The holotype and four paratypes have the following average dimensions: total length, 1.6 mm; greatest diameter, 0.4 mm; head length, 0.3 mm; head diameter, 0.2 mm; diameter segment I, 0.2 mm; diameter, sucker, 0.2 mm.

The lips apppar to be without lobes or indentations, but the upper and lower lips are separated by wide indentations on each side that produce low lateral lobes. No oral papillae are apparent. The peristomial sulcus is prominent; there is one other shallow external sulcus of the head and one internal pharyngeal sulcus. There are no dorsal ridges or supernumerary segmental muscles, though because of variations in the extent of contraction, segment VIII sometimes appears to have a dorsal ridge. The clitellum is inconspicuous.

The jaws are thin and delicate; the upper bears five small sharp teeth, the lower four.

The bursa is marked externally by two shallow constrictions; one setting off the bursal atrium, the other at the mid-length of the penial sheath. The atrium is proportionately small and there is an atrial fold. The penial sheath is an elongate, thin-walled structure with the penis loosely looped inside. A slender tube, the penis is provided with numerous hooks along its ectal portion, from about the external constriction of the penial sheath, and acquires a thicker wall along the more numerous loops of its ental portion. The penis is connected with the inner wall of the penial sheath by strands of tissue at the juncture of its outer and inner portions. There can be no doubt that it is eversible to at least this connection with the penial sheath (though no specimens with everted penes have been seen), carrying the many cuticular hooks which come to lie outside as it everts.

The ejaculatory duct is a short muscular tube.

The spermiducal gland is small, about ⅖ of the body diameter in length. The prostatic protuberance is an ill-defined, minute lobe at the ental end of the spermiducal gland that is not histologically different from the latter.

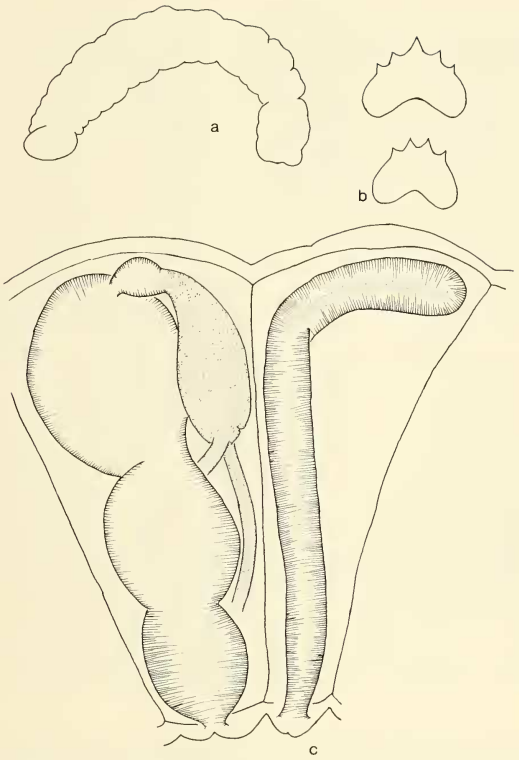

Fig. 2. *Oedipodrilus cuetzalanae,* new species; holotype. a, Outline of entire animal; b, Jaws; c, Lateral view of reproductive systems.

The spermatheca is notable for its long, slender ectal duct. The spermathecal bulb is thick-walled, resembling in this respect, the ental process of the spermatheca of some species.

Variations.—None, other than the usual ones produced by differences in contraction of the body at death, were noted.

Affinities.—Only two species of *Oedipodrilus, O. oedipus* Holt, 1967, and *O. macbaini* (Holt, 1955), have been described as of now. *Oedipodrilus cuetzalanae* is composed of slightly larger worms than its congeners: 1.6 mm in length as opposed to 1.3 mm and 1.2 mm respectively. *Oedipodrilus oedipus* has distinct,

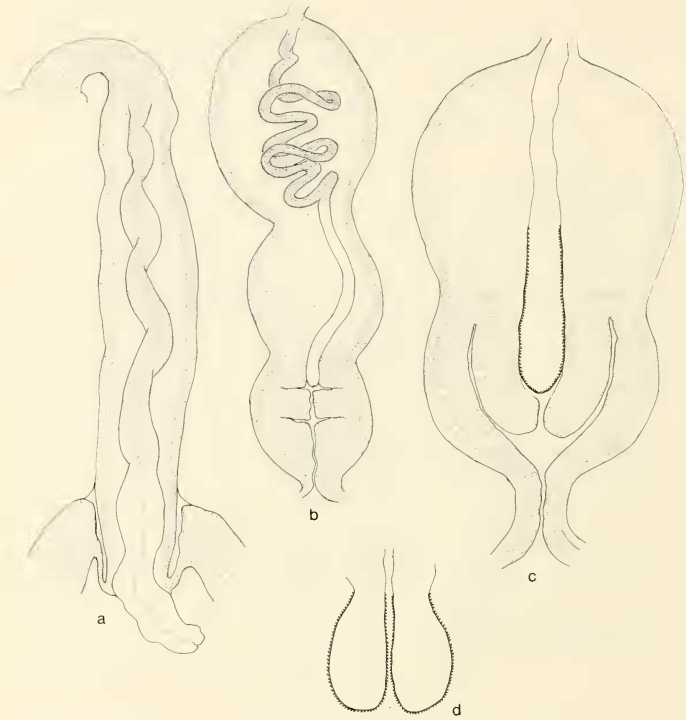

Fig. 3. Optical sections through penes of some branchiobdellid worms. a, *Sathodrilus villalobosi,* specimen from Sima Zoquiapan, Cuetzalan, Puebla; b, *Oedipodrilus cuetzalanae,* holotype; c, *Oedipodrilus oedipus,* paratype; d, *O. oedipus,* tip of partially everted penis, paratype.

well marked, dorsal ridges, absent in *O. macbaini* and *O. cuetzalanae.* The bursae, including penial sheaths, are more robust in the other species than in *O. cuetzalanae.* The prostate is small and obscure in all three species, but so much so in *O. cuetzalanae* that its very existence was almost overlooked—in the limited and only moderately well preserved material available, it would not have been noticed except that its presence in the other species occasioned a very careful search. The ectal duct of the spermatheca of *O. cuetzalanae* is longer and much more slender than in *O. oedipus*; the spermatheca is more slender in its entirety than in *O. macbaini.* The three known species of the genus form a coherent group and it is futile at this stage to speculate about which is more closely related to the other.

Host.—*Procambarus* (*Villalobosus*) *cuetzalanae* Hobbs.

Distribution.—Known only from the type-locality, which is a *sima* ". . . a vertical or nearly vertical pit" (Reddell 1981:4), hence a cave or cave-like sinkhole. It may be noted that the epigean *O. machaini* is also found in caves (Holt 1973b).

Material examined.—Twenty-one specimens.

Remarks.—The comments in Holt (1967:58–60) as to the affinities of the genus *Oedipodrilus* still hold. But at that time some specimens later assigned to *Sathodrilus* were confused with *Oedipodrilus*, which is not known from Veracruz or the Pacific Northwest of the United States. The confusion resulted from a misunderstanding of the structure of the penis.

The penis of species of *Oedipodrilus* is a chitinoid tube, clearly eversible, provided with many small recurved hooks, which may vary from species to species in proportionate length and diameter (Fig. 3b–c), while that of *Sathodrilus* lacks hooks, is attached by thin strands of tissue to the inner wall of the penial sheath throughout the extent of the latter and everts as a wider, membranous tube similar to that of species of *Ceratodrilus* (Holt, 1960:69–70, 75, Fig. 7).

Sathodrilus villalobosi Holt, 1968
Fig. 3a

Sathodrilus villalobosi Holt, 1968:299–302; 1973a:36–38; 1977:119.

Nothing new can be added to the previous accounts of *S. villalobosi* except the drawing (Fig. 3a) of an optical section of the penial sheath and penis which complements that given with the original description (Holt 1968:300, Fig. 3) and the following locality records which mostly are from caves or cave-like pits.

New locality records.—Sima Zoquiapan, 1.1 km north of Cuetzalan, Puebla. Twenty-three specimens taken on *Procambarus* (*Villalobosus*) *cuetzalanae* Hobbs, 1982, by L. Wilk, J. Hooper and M. Minton 2 Jan 1980. PCH 4050.

Cueva de Guayateno, Jonotla, Puebla. Two specimens (host *P.* (*V.*) *cuetzalanae*) taken by S. Robertson, 27 Dec 1980. PCH 4057, 4063.

Sumidero de Tzitzihualayoll, Cuetzalan, Puebla. One specimen (host *P.* (*V.*) *cuetzalanae*) taken by J. Reddell *et al.*, 26 Mar 1981. PCH 4060.

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